REMARKS

Status of the Claims

Claims 37-68 are pending in the above-identified application, with Claims 42-45 and 49-50 being withdrawn due to a restriction requirement. Claims 54, 58, and 63-64 are amended herein. Claim 68 is new. Support for the amendments and the new claim is found throughout the specification. Hence, the amended and new claims do not introduce new matter into this application. The above amendments have not been made in view of the rejections.

Election of Species

Applicants confirm the species election as discussed in the Examiner-Initiated Interview Summary attached to the above-identified Office Action.

Rejections Under 35 U.S.C. § 102

Claims 37-38, 41, 47-48, 51-53, 58, 62 and 64 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,386,751 to Wootan et al. ("*Wootan*"). Respectfully, this rejection is traversed.

As claimed in the rejected, independent claims, the present invention is directed to a method of mixing dissimilar fluids (Claims 37 and 62) and a method of mixing a gas and a liquid (Claims 58 and 64) in a region comprising a plurality of cavitation zones. Each cavitation zone has a void zone adjacent thereto. As provided in the specification:

> [t]he rotor 17 has a peripheral surface that is formed with one or more circumferentially extending arrays of irregularities in the form of relatively shallow holes or bores 24. In the illustrated embodiment, the rotor 17 is provided with two arrays of bores 24 separated by a void 26, the purpose of which is described in more detail below. It should be understood, however,

that fewer or more than two arrays of bores may be provided in the peripheral surface of the rotor as desired depending upon the intended application of the hydrosonic mixer 11. Further, irregularities other than holes or bores also may be provided. The rotor 17 is sized relative to the cylindrical chamber 15 in which it is housed to define a space, referred to herein as a cavitation zone 32, between the peripheral surface of the rotor and the cylindrical wall of the chamber 15. (Emphasis added.)

Paragraph [0021], of the Published Application 2004-0103783 of the present invention. Additionally, the specification further states:

An outlet port 35 is provided in the housing 12 and, in the illustrated embodiment, is located in the cylindrical wall of the housing to communicate with the cavitation zone 32 in a region of the rotor intermediate or between the arrays of bores 24. Location of the outlet port 35 in this way ensures that the entire volume of the gas/liquid mixture traverses at least one of the arrays of bores 24 and thus moves through a cavitation zone prior to exiting the hydrosonic mixer 11. Further, location of the outlet port 35 within the region of the inner chamber 15 aligned with the void 26 of the rotor prevents cavitation damage that otherwise might occur if the outlet port 35 were aligned with an array of bores 24. An outlet conduit 33 is coupled to the outlet port 35 for receiving treated black liquor and excess air from the hydrosonic mixer 11 and delivering it to a remote location for separation of the excess air from the treated black liquor and subsequent use of the treated black liquor.

Paragraph [0024] of the Published Application 2004-0103783 of the present invention. Thus, a "cavitation zone" is defined as a space between the peripheral surface of the rotor and the cylindrical wall of the chamber 15. See also Paragraphs [0012], [0013], and footnote 1. Cavitation occurs within the cavitation zone at, on, or within the respective irregularities. Further, the arrays of irregularities are separated by voids, thus creating a void zone, which is substantially free of cavitation, between the respective cavitation zones. For example, Claims

52 and 53 are directed to certain physical aspects of the present invention. *Wootan* is silent with respect to the elements of these claims.

According to the PTO, the diffuser/emulsifier of *Wootan* uses cavitation to mix various gases and liquids. *Wootan* describes a method of mixing where one or more infusion materials (e.g., a gas, oxygen) are introduced through openings – numeral 22 in the figures – and are contacted with the host material (e.g., a liquid, water) See *Wootan*, column 3, lines 10-22, and Figures 1-6. The infusion material flows through openings 22 that are formed in the rotor 12. See column 2, lines 55-65. In addition, the stator 30 that encompasses the rotor also has openings 22. See column 2, line 66, through column 3, line 5. Notably, the host material flows through conduit 37 into channel 32. Channel 32 is the interstitial space between the rotor and the stator. Accordingly, cavitation and subsequent mixing occurs within channel 32 when the rotor 12 is rotated at certain velocities. Specifically, *Wootan* states:

> The reason for the high efficiency and persistence of the diffusion is believed to be the result of micro-cavitation, which is described in connection with FIGS. 2a-c. Whenever a material flows over a smooth surface, a rather laminar flow is established with a thin boundary layer that is stationary or moving very slowly because of the surface tension between the moving fluid and the stationary surface. The openings 22, however, disrupt the laminar flow and can cause compression and decompression of the material. If the pressure during the decompression cycle is low enough, voids (cavitation bubbles) will form in the material. The cavitation bubbles generate a rotary flow pattern 46, like a tornado, because the localized area of low pressure draws the host material and the infusion material, as shown in FIG. 2a. When the cavitation bubbles implode, extremely high pressures result. As two aligned openings pass one another, a succusion (shock wave) occurs, generating significant energy. The energy associated with cavitation and succussion mixes the

infusion material and the host material to an extremely high degree, perhaps at the molecular level.

Wootan, column 3, lines 29-49, and Figures 1 and 2a-c. Thus, as clearly stated by *Wootan* and as dramatically illustrated in Figure 2a-c, cavitation occurs throughout channel 32 with no voids or void zones therein. Thus, *Wootan* does not teach or suggest a region comprising a plurality of cavitations zones, each cavitation zone having a void zone adjacent thereto. Accordingly, *Wootan* does not teach or suggest each and every element of the claimed invention.

The claimed invention is also not taught or suggested in *Wootan's* other embodiments, such as where the stator 30 is rotated in combination with the rotation of the rotor 12. Related to this embodiment, cavities, boreholes, bumps/protrusions, or grooves/ridges are used in addition to or as a replacement for the openings in the preferred embodiment. See *Wootan*, column 6, line 33, through column 7, line 45. However, none of these teach or suggest the claimed invention, i.e., a region comprising a plurality of cavitations zones, each cavitation zone having a void zone adjacent thereto. Thus, *Wootan* does not teach or suggest each and every element of the claimed invention.

Accordingly, Applicants respectfully request that the rejection of Claims 37-38, 41, 47-48, 51-53, 58, 62 and 64 under 35 U.S.C. § 102(e) as being anticipated by *Wootan* be withdrawn.

Claims 37-40, 46-48, 51, and 54-67 are rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Patent Abstract Publication Number 60226594 to Mitsuhisa ("*Mitsuhisa*"). Respectfully, this rejection is traversed.

The claimed invention is discussed above and not repeated here for brevity. According to the PTO, *Mitsuhisa* discloses processing fuel oil and a gas (e.g., air) to generate a fuel in an excited state to enhance combustion. An apparatus comprising a rough rotor generates cavitation to produce the fuel. The PTO states that the void zone adjacent to the

cavitation zone would have been inherent to the use of the *Mitsuhisa* process. Applicants respectfully disagree.

Mitsuhisa is an abstract of a published Japanese application and vaguely describes a method and apparatus for producing an enhanced-combustion fuel oil by mixing fuel oil and an oxygen-containing gas. As stated in the "Constitution" section, "[a] fuel oil and O_2-contg. gas such as air are introduced...into casing 2 in which a magnetic field is formed followed by high-speed revolution...of coarse-surface rotors 3 contained to generate both cavitation and induced electromotive force in said casing to disperse the fuel oil and O_2-contg. gas into ultrafine particles, thus decomposing or bringing to an excited state said fuel oil to achieve the objective modification." Referring to the figure of *Mitsuhisa*, the device appears to have a rotor 3 with arms 5 extending out from the peripheral surface of the rotor. It also appears that the casing 2 has a plurality of baffles 6 that extend from the casing inner surface toward the rotor. Based upon the figure, the cavitation generated in the apparatus occurs randomly between the arms and the baffles, and not between the outer peripheral surface of the rotor and the cylindrical wall of the housing chamber, as in the claimed invention. At best, *Mitsuhisa* has random cavitation. Further, the device in *Mitsuhisa* lacks a void zone.

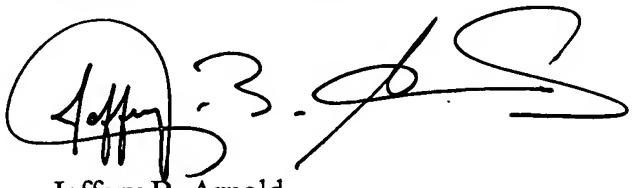
Applicants assert that *Mitsuhisa* does not teach or suggest a region comprising a plurality of cavitation zones, each cavitation zone having a void zone adjacent thereto. Thus, *Mitsuhisa* does not teach or suggest each and every element of the claimed invention. Accordingly, Applicants respectfully request that the rejection of Claims 37-40 46-48, 51, and 54-67 under 35 U.S.C. § 102(b) as being anticipated by *Mitsuhisa* be withdrawn.

CONCLUSION

In view of the above amendments and remarks, Applicants respectfully assert that the rejection of the claims as set forth in the Office Action has been fully addressed and overcome. Hence, Applicants assert that all Claims are in condition for allowance and request that an early notice of allowance be issued. If issues may be resolved by Examiner's Amendment, or clarified in any manner, a call to the undersigned attorney at (404) 879-2433 is respectfully requested.

No fees are believed due, however, the Commissioner is hereby authorized to charge any deficiencies which may be required, or credit any overpayment to Deposit Order Account No. 09-0528.

Respectfully submitted,



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